YANMAR

HINSI-H8-011-1

SERVICE MANUAL

MARINE DIESEL ENGINE

6LY2-STE
6LY2A-STP
6LYA-STP

YANMAR

SERVICE MANUAL

MARINE DIESEL ENGINE

MODEL

6LY2-STE

6LY2A-STP

6LYA-STP

Publication No.	HINSHI - H8 - 011 - 1

History of Revision

Manual Name	Service Manual for Marine Diesel Engine
Engine Model :	**6LY2-STE/6LY2A-STP/6LYA-STP**

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FOREWORD

This service manual has been complied for engineers engaged in sales, service, inspection and maintenance. Accordingly, descriptions of the construction and functions of the engine are emphasized in this manual while items which should already be common knowledge are omitted.
One characteristic of a marine diesel engine is that its performance in a vessel is governed by the applicability of the vessel's hull construction and its steering system.
Engine installation, fitting out and propeller selection have a substantial effect on the performance of the engine and the vessel. Moreover, when the engine runs unevenly or when trouble occurs, it is essential to check a wide range of operating conditions — such as installation to the hull and suitability of the ship's piping and propeller — and not just the engine itself. To get maximum performance from this engine, you should completely understand its functions, construction and capabilities, as well as proper use and servicing.
Use this manual as a handy reference in daily inspection and maintenance, and as a text for engineering guidance.

METRIC
ALL DIMENSIONS IN MILLIMETERS
UNLESS OTHERWISE SPECIFIED

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CHAPTER 1

GENERAL

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■ For Safe Servicing

- Most accidents are caused by failing to observe basic safety rules and precautions. To prevent accidents, it is important to recognize the signs of approaching problems, and eliminate the problems in the early stage before they can cause accidents.
  Please read this manual carefully before starting repairs or maintenance to fully understand safety precautions and appropriate inspection and maintenance procedures. Attempting a repair or maintenance job without sufficient knowledge may cause an unexpected accident.

- It is impossible to cover every possible danger in repair or maintenance in the manual. Sufficient consideration for safety is required in addition to the matters marked ⚠ CAUTION. Especially for safety precautions in a repair or maintenance job not described in this manual, receive instructions from a knowledgeable leader.

- Safety marks used in this manual and their meanings are as follows:

⚠ DANGER	**DANGER indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**
⚠ WARNING	**WARNING indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.**
⚠ CAUTION	**CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

- Any matter marked **[NOTICE]** in this manual is especially important in servicing. If not observed, the product performance and quality may not be guaranteed.

■ Precautions for Safe Servicing

(A) Service Shop (Place)

⚠WARNING

● Place allowing sufficient ventilation

Jobs such as engine running, part welding and polishing the paint with sandpaper should be done in a well-ventilated place.

[Failure to Observe]

Very dangerous for human body due to the possibility of inhaling poisonous as or dust.

⚠CAUTION

● Sufficiently wide and flat place

The floor space of the service shop for inspection and maintenance should be sufficiently wide and flat without any holes.

[Failure to Observe]

An accident such as a violent fall may be caused.

⚠CAUTION

● Clean, orderly arranged place

No dust, mud, oil or parts should be left on the floor surface.

[Failure to Observe]

An unexpected accident may be caused.

⚠CAUTION

● Bright, safety illuminated place

The working place should be illuminated sufficiently and safely.

For a job in a dark place where it is difficult to see, use a portable safety lamp.

The bulb should be covered with a wire cage for protection.

[Failure to Observe]

The bulb may be broken accidentally causing ignition of leaking oil.

⚠CAUTION

● Place equipped with a fire extinguisher

Keep a fast aid kit and fire extinguisher close at hand in preparation for fire emergencies.

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(B) Working Wear

⚠CAUTION

● Wears for Safe Operation

Wear a helmet, working clothes, safety shoes and other safety protectors suited to the job. It is especially important to wear well-fitting work clothes.

[Failure to Observe]
A serious accident such as trapping by a machine may occur.

(C) Tooks to Be Used

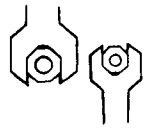
⚠WARNING

● Appropriate holding and lifting

Never operate when the engine is supported with blocks or wooden pieces or only with a jack.
To lift and hold the engine, always use a crane with a sufficient allowance in limit load or a rigid jack.

[Failure to Observe]
A serious accident may occur.

⚠WARNING



● Use of Appropriate Tools

Use tools appropriate for the jobs to be done. Use a correctly sized tool for loosening or tightening a machine part.

[Failure to Observe]
A serious accident such as trapping by a machine may occur.

(D) Use of Genuine Parts, Oil and Grease

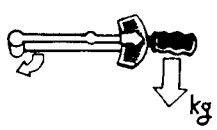
⚠CAUTION

● Always use genuine parts.

[Failure to Observe]
Shortening of engine life or an unexpected accident may arise.

(E) Bolt and Nut Tightening Torque

⚠WARNING

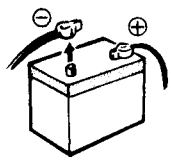


● Always tighten to the specified torque if designated in the manual.

[Failure to Observe]
Loosening or falling may cause parts damage or injury.

(F) Electrical Parts

⚠ WARNING

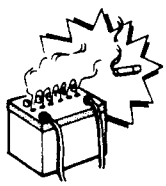


● Harness Short-circuit

Disconnect the battery negative ⊖ terminal before starting the service job.

[Failure to Observe]
Short-circuiting of a harness may occur to start a fire.

⚠ WARNING



● Battery Charging

Since flammable gas is generated during battery charging, keep anything which could cause a fire away from the battery.

[Failure to Observe]
Explosion may occur.

⚠ WARNING

● Battery Electrolyte

Since the electrolyte is diluted sulfuric acids, do not let it be splashed onto clothes or skin.

[Failure to Observe]
The clothes or skin may be burnt.

(G) Waste Treatment

⚠ CAUTION

Observe the following instructions with regard to waste disposal. Negligence of each instruction will cause environmental pollution.

- Waste fluids such as engine oil and cooling water shall be discharged into a container without spillage onto the ground.
- Do not let waste fluids be discharged into the sewerage, a river or the sea.
- Harmful wastes such as oil, fuel, solvents, filterelements and battery shall be treated according to the respective laws and regulations.
  Ask a qualified collecting company for example.

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(H) Handling the Product

⚠WARNING

● Supplying the Fuel

When supplying the fuel, always keep any fire source like a cigarette or match away.

[Failure to Observe]
A fire or explosion may arise.

⚠WARNING

● Pay attention to hot portions.

Do not touch the engine during running or immediately after it is stopped.

[Failure to Observe]
Scalding may be caused by a high temperature.

⚠WARNING

● Pay attention to the rotating part.

Never bring clothes or a tool close to the rotating part during engine running.

[Failure to Observe]
Injury may be caused by entrapping.

⚠CAUTION

● Safety Label Check

Pay attention to the product safety label.
A safety label (caution plate) is affixed on the product for calling special attention to safety.
If it is missing or illegible, always affix a new one.

California Proposition 65 Warning

Diesel engine exhaust and some of its constitutions are known to the State of California to cause cancer, birth defects, and other reproductive harm.

California Proposition 65 Warning

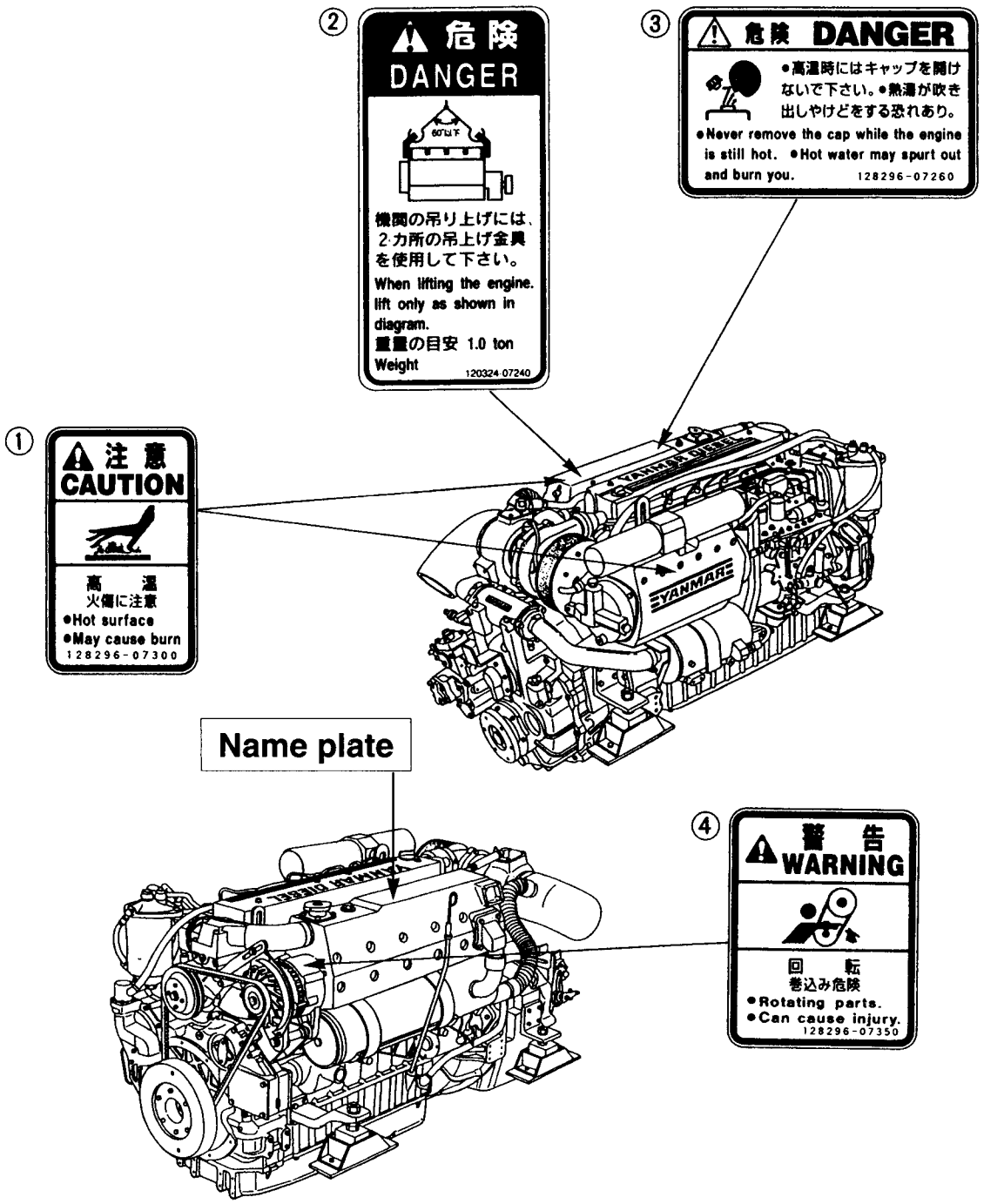
Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.

■ Location of Product Safety Labels

To insure safe operation, warning device labels have been attached. Their location is shown in the diagram below. Keep the labels from becoming dirty or torn and replace them if they are lost or damaged.
Also, replace labels when parts are replaced, ordering them in the same way as for the parts

Warning Device Labels, Parts Numbers

No.	Part Code No.
①	128296-07300
②	120324-07240
③	128296-07260
④	128296-07350



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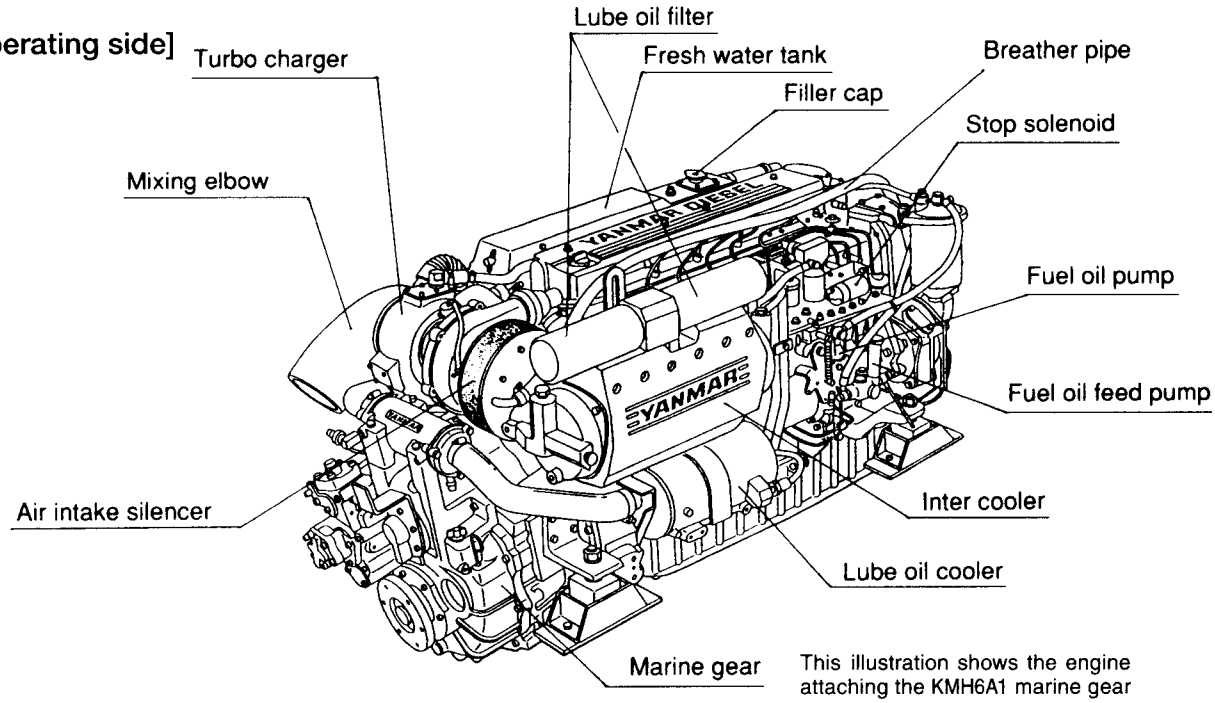
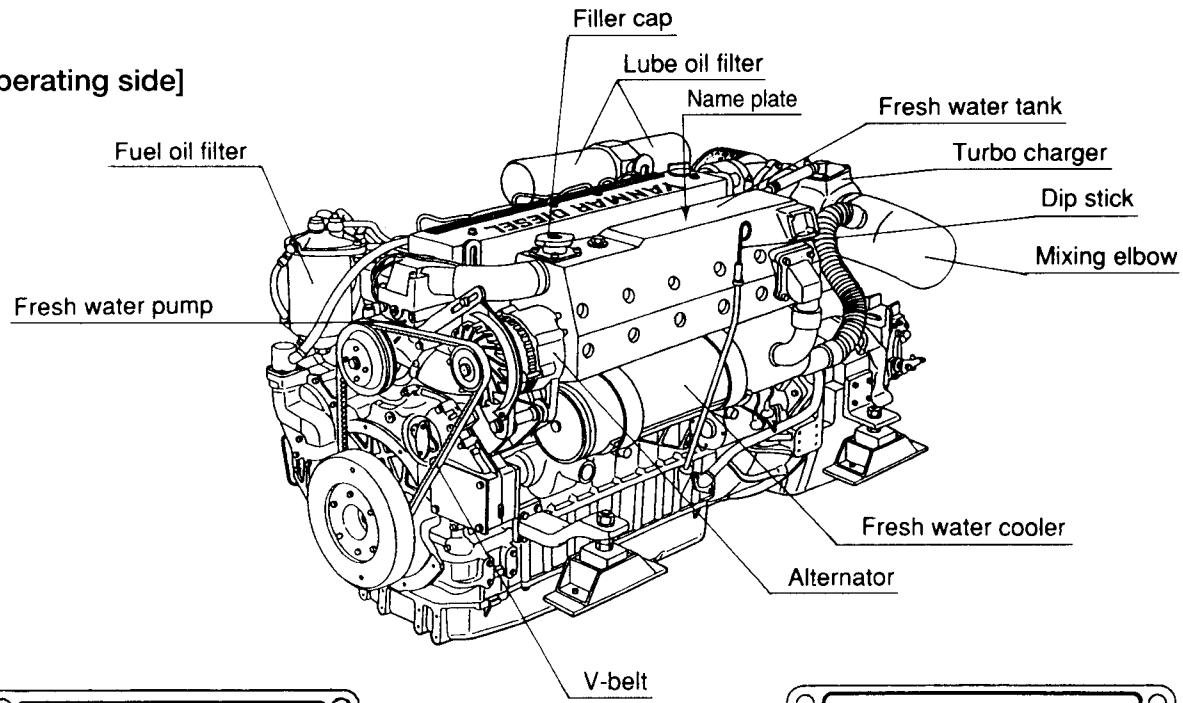
1. Exterior Views

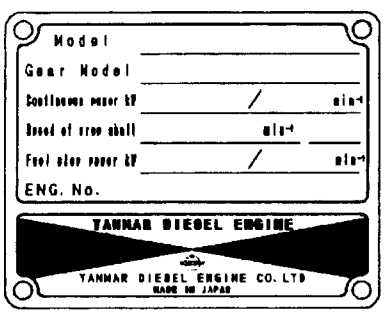
[Operating side]



This illustration shows the engine attaching the KMH6A1 marine gear

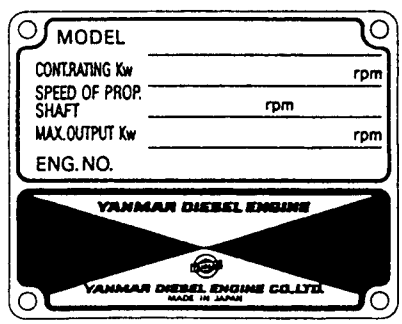
[Non-operating side]





For 6LY2A-STP/6LYA-STP

The name plate attached on the engine.



For 6LY2-STE

2. Specifications

• 6LY2-STE

Engine model		6LY2-STE							
Type		Vertical water coo;ed 4-cycle diesel engine							
No. of clinders		6							
Bore × Stroke (mm)		φ105.9 × 110							
Displacement (ℓ)		5.813							
Max. output at crankshaft kw(hp)/rpm.		309(420)/3300							
Cont. rating output at crankshaft. kw(hp)/rpm.		257(350)/3100							
High idling (rpm)		3720±25							
Low idling (rpm)		700±25							
Combustion system		Direct injection							
Starting system		Electric starting							
Cooling system		Fresh water cooling							
Lubrication system		Totally enclosecl and forced lubrication system with gear pump							
Direction of rotation		Counterclockwise when viewed from flywheel side							
Marine gear (Option)	Model	KMH6A1 (Optional)			※MG5061A (TWIN DISC made)				
	Type	10° Angle			7° Angle				
	Reduction ratio (Ahead/Astern)	Oil pressure, wet type, Multi-disc type			Oil pressure, wet type, Multi-disc type				
		1.58	1.92	2.26	1.13	1.54	1.75	2.00	2.47
Lube oil capacity	Engine (ℓ)	Full 20.0 / Effective 8.0							
	Marine gear (ℓ)	Full 4.0 / Effective 0.3 (For KMH6A1)							
Cooling water capacity (ℓ)		20							
Subtank capacity (ℓ)		1.5							
Turbochager	Model	RHC7W (IHI made)							
Type		Water cooled							
Dry weight (kg)		642							
Recommended battery capacity		12V-120AH							
Recommended type of remote control handle		Single lever type (Option)							
Engine installation style		On the flexible engine mount							

(Note) 1. Rating condition : ISO 3046-1. 2. 1hp = 0.7355 kW.
※Local supply.

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● 6LY2A-STP/6LYA-STP

Engine model			6LYA-STP	6LY2A-STP
Type			Vertical water cooled 4-cycle diesel engine	
No. of clinders			6	
Bore × Stroke		mm	100×110	105.9×110
Displacement		ℓ	5.184	5.813
Fuel stop power at crankshaft		kw(hp)/rpm	*272 (370) / 3300 **264 (359) / 3300	*324 (440) / 3300 **315 (427) / 3300
Cont. power at crankshaft.		kw(hp)/rpm	213 (290) / 3100	257 (350) / 3100
High idling		rpm	3720±25	3670±25
Low idling		rpm	700±25	
Combustion system			Direct injection	
Starting system			Electric starting	
Cooling system			Fresh water cooling	
Lubrication system			Forced lubrication system with gear pump	
Direction of rotation (crankshaft)			Counter clockwise (viewed from flywheel side)	
Lube oil capacity	All	ℓ	20	
	Oil pan	ℓ	18(including oil filter capacity)(oil pan 16.4)	
Cooling water capacity		ℓ	Engine:20, Subtank :1.5	
Turbochager	Model		RHC7W (IHI made)	
	Type		Water cooled turbine housing	
Dry mass(gear less)		kg	530	535
Recommended battery capacity			12V×120Ah	
Recommended type of remote control handle			Single lever type	
Engine installation style			On the flexible engine mount	

(Note) 1. Rating condition : ISO 3046-1, 8665 2. 1hp = 0.7355 kW
3. Fuel condition : Density at 15℃ = 0.860, Fuel oil temperature *: 25℃ at the fuel injection pump inlet
**: ISO 8665 (Fuel oil temp. 40℃ at the fuel injection pump inlet)

● Marine gear (Option)

• For 6LYA-STP

Model			KMH6A			HSW800A2					MG5050A				
Type			10°Angle			8°Angle					10°Angle				
			wet and multi-disc												
Reduction ratio			1.58	1.92	2.26	1.2	1.4	1.6	2.0	2.5	1.12	1.5	1.8	2.04	2.5
Lube oil capacity	Full	ℓ	4.0			Refer to the maker's manual									
	Effective	ℓ	0.3												

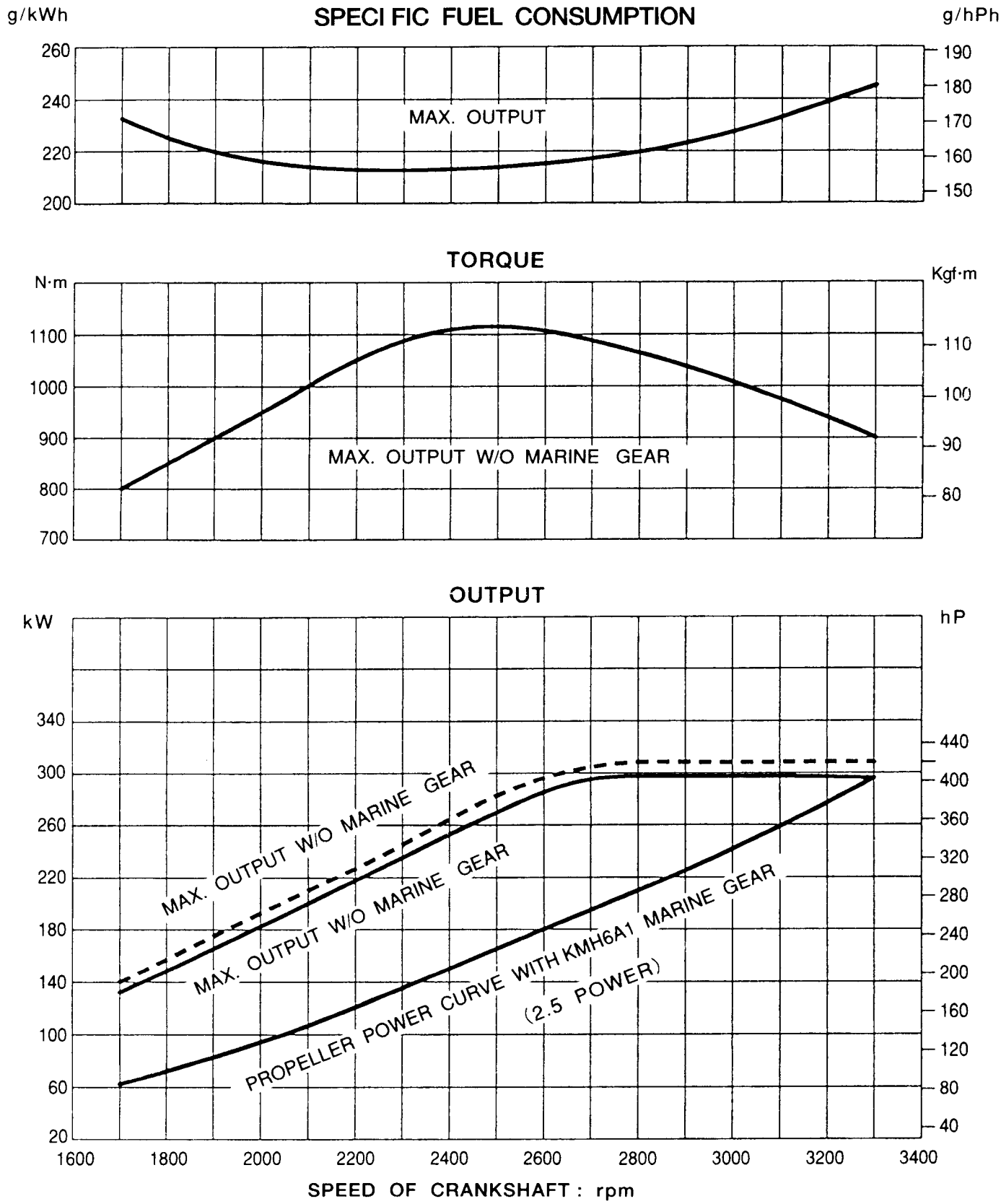
• For 6LY2A-STP

Model			KMH6A1			MG5061A				
Type			10° Angle			7° Angle				
			wet and multi-disc							
Reduction ratio			1.58	1.92	2.26	1.13	1.54	1.75	2.00	2.47
Lube oil capacity	Full	ℓ	4.0			Refer to the maker's manual				
	Effective	ℓ	0.3							

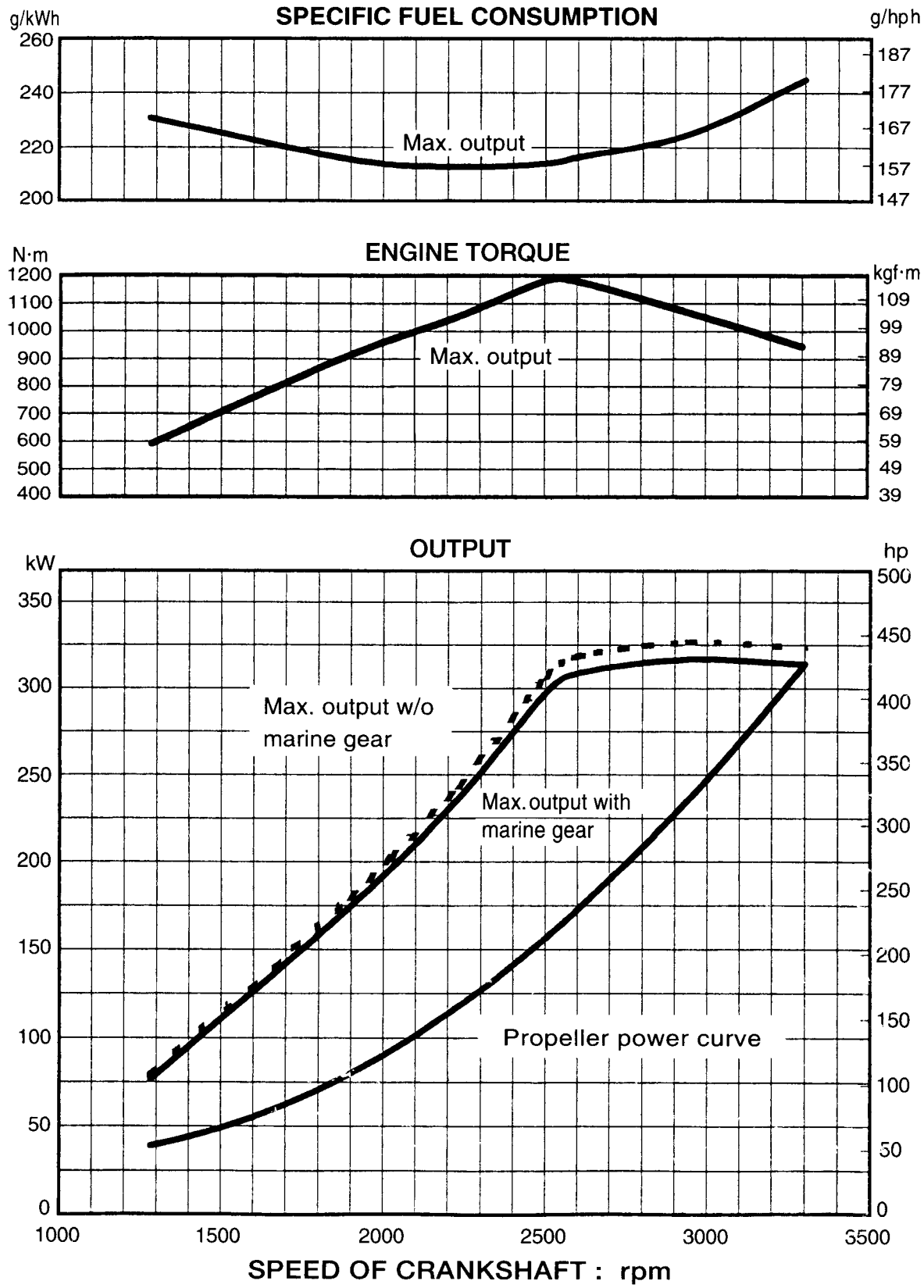
(Note)
Reduction ratio :
Both afead and astern

3. Performance Curve

〔6LY2-STE (Max. output : 309kW/3300rpm)〕



〔6LY2A-STP (Fuel stop power : 324kW/3300rpm)〕



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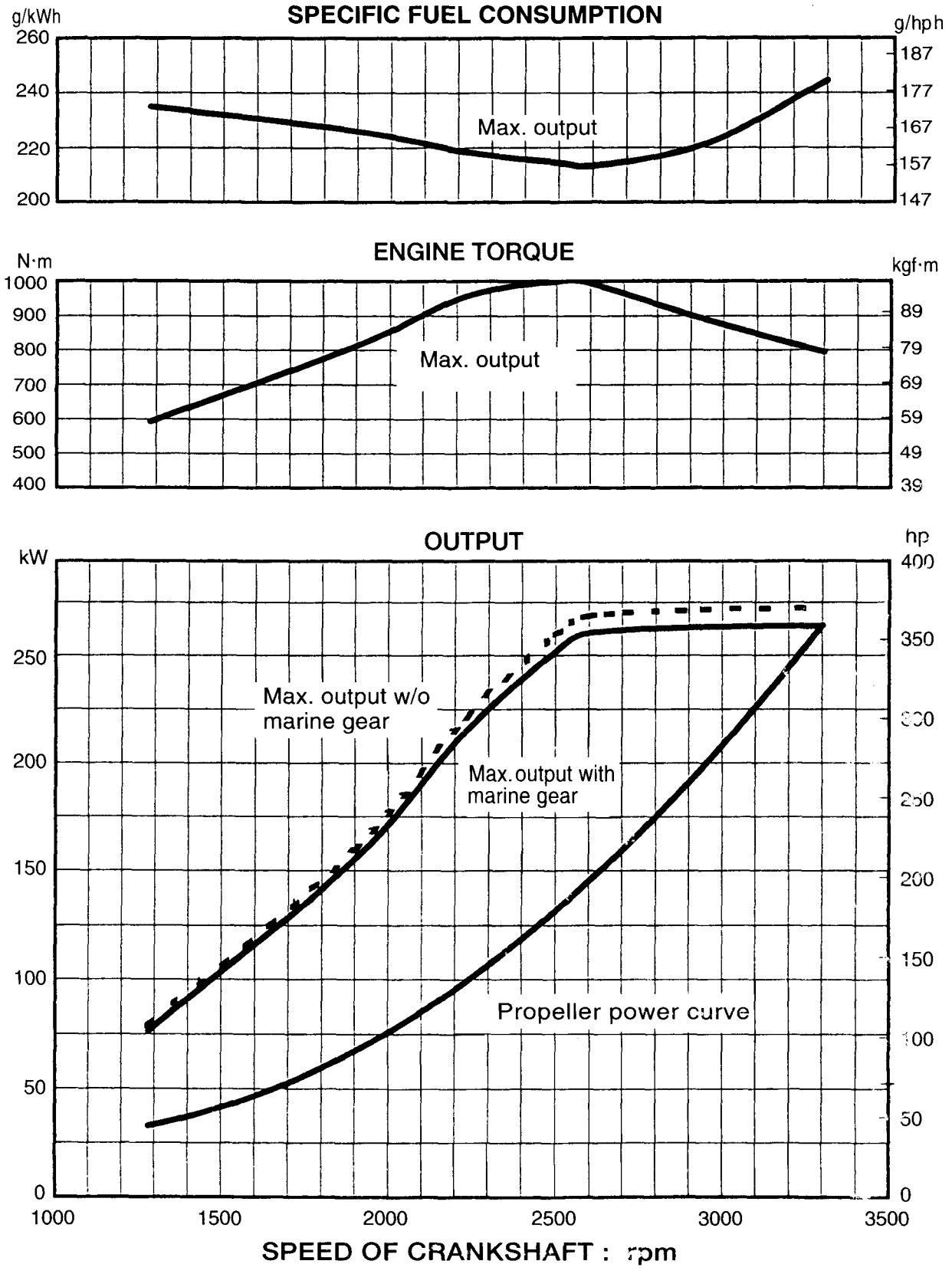
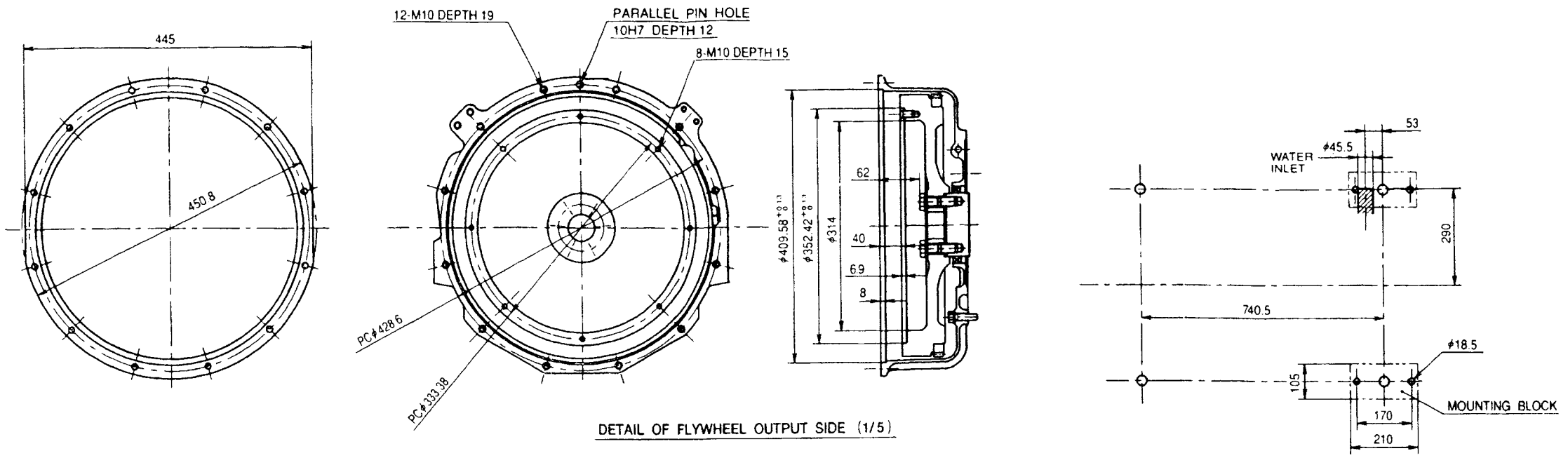
〔6LYA-STP (Fuel stop power : 272kW/3300rpm)〕

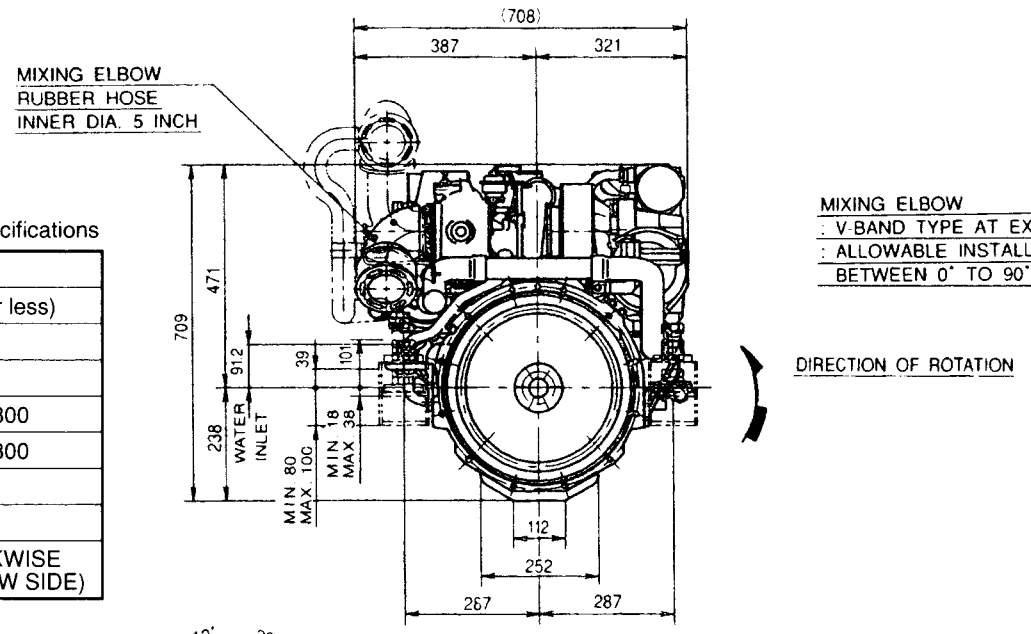


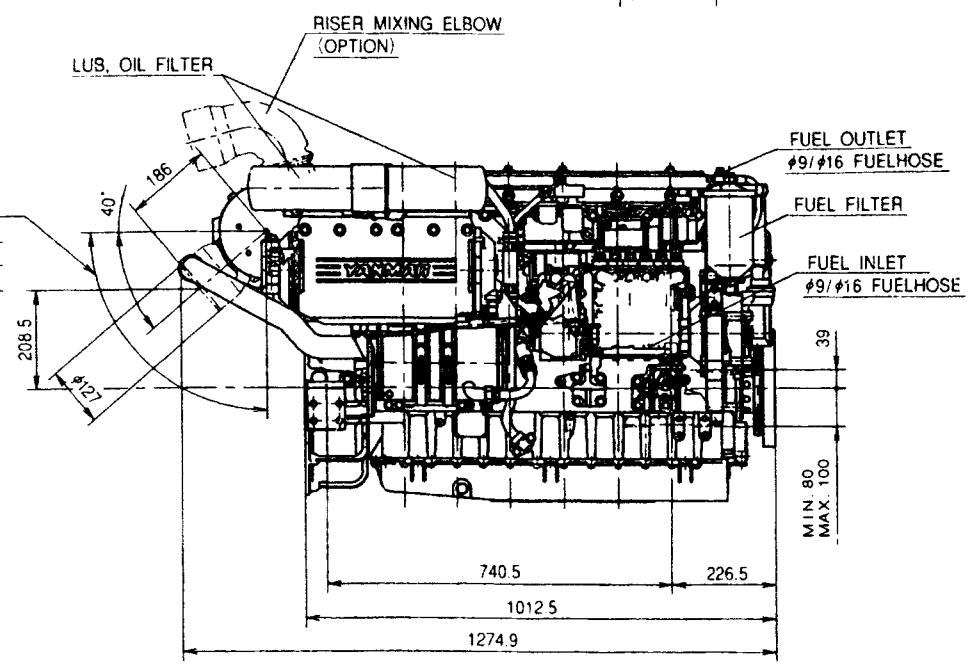
4. Dimensions

6LY2-STE / 6LY2A-STP / 6LYA-STP Outline



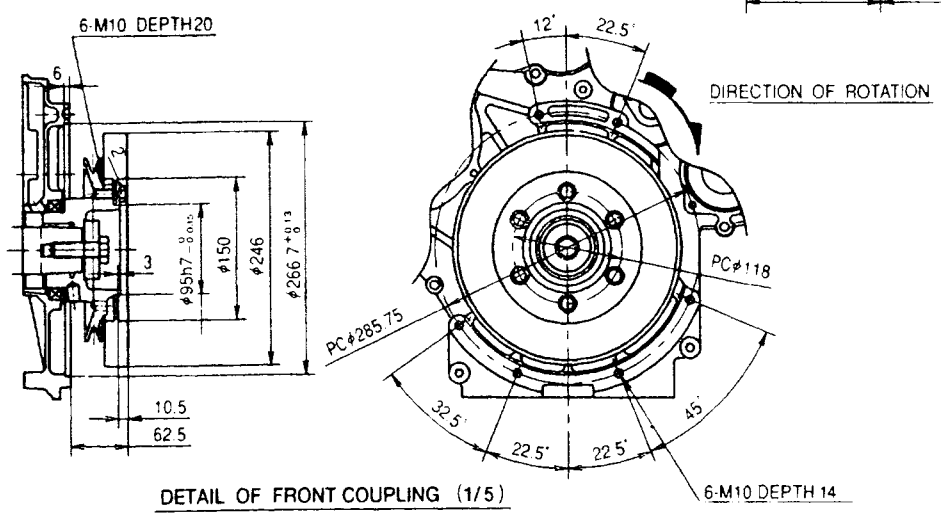
DETAIL OF FLYWHEEL OUTPUT SIDE (1/5)





*,**: See 2, Specifications

SPECIFICATIONS		
MODEL		6LYA-STP (Gear less)
CONT. POWER (FLYWHEEL OUTPUT)	hp/rpm	290/3100
	kw/rpm	213/3100
FUEL STOP POWER (FLYWHEEL OUTPUT)	hp/rpm	*370, **359/3300
	kw/rpm	*272, **264/3300
NUMBER OF CYLINDER		6
DRY MASS	kg	530
DIRECTION OF CRANKSHAFT ROTATION		COUNTER CLOCKWISE (VIEWED FROM F/W SIDE)



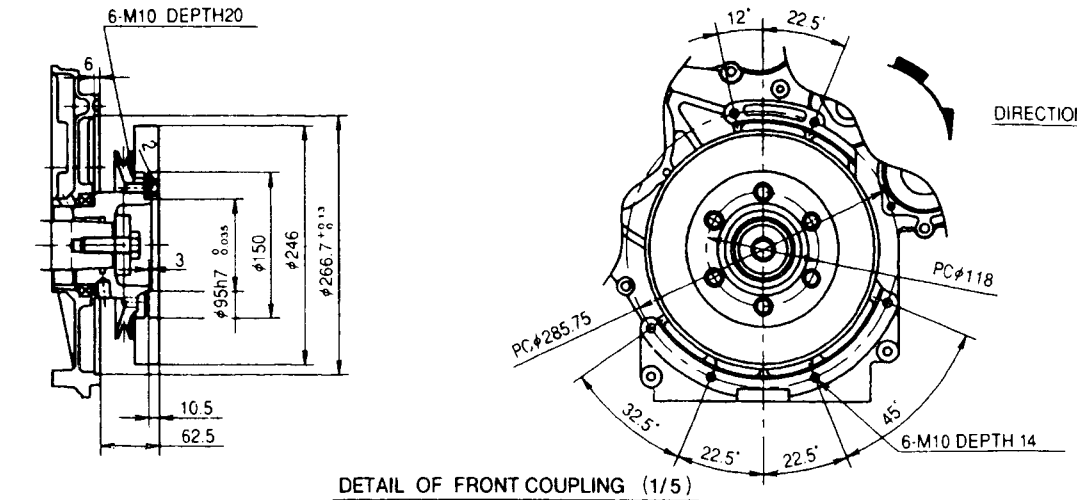
DETAIL OF FRONT COUPLING (1/5)

*,**: See 2, Specifications

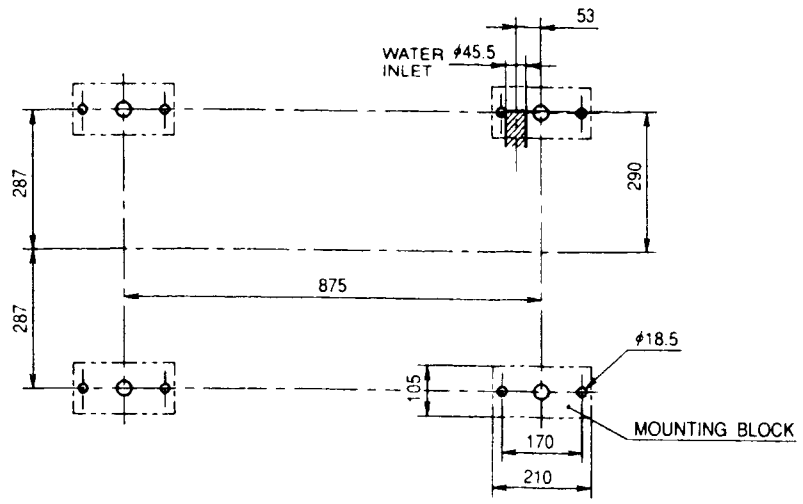
SPECIFICATIONS		
MODEL		6LY2-STE
CONT. RAITING OUTPUT (FLYWHEEL OUTPUT)	hp/rpm	350/3100
	kw/rpm	257/3100
MAX OUTPUT (FLYWHEEL OUTPUT)	hp/rpm	420/3300
	kw/rpm	309/3300
NUMBER OF CYLINDER		6
DRY MASS	kg	535
DIRECTION OF CRANKSHAFT ROTATION		COUNTER CLOCKWISE AT FLYWHEEL SIDE

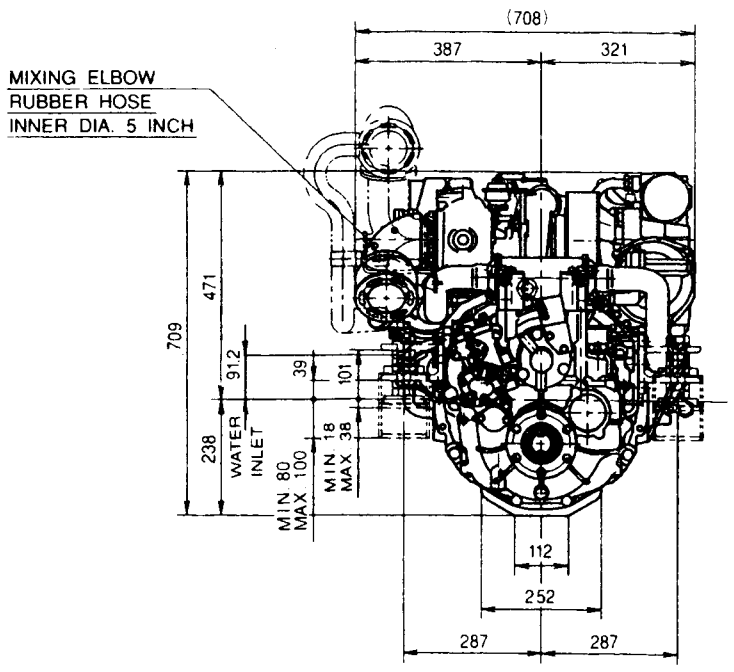
SPECIFICATIONS		
MODEL		6LY2A-STP (Gear less)
CONT. POWER (FLYWHEEL OUTPUT)	hp/rpm	350/3100
	kw/rpm	257/3100
FUEL STOP POWER (FLYWHEEL OUTPUT)	hp/rpm	*440, **427/3300
	kw/rpm	*324, **315/3300
NUMBER OF CYLINDER		6
DRY MASS	kg	535
DIRECTION OF CRANKSHAFT ROTATION		COUNTER CLOCKWISE (VIEWED FROM F/W SIDE)

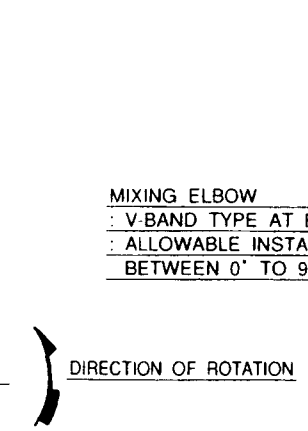
〔6LY2-STE/6LY2A-STP〕 Outline (KMH6A1 marine gear)

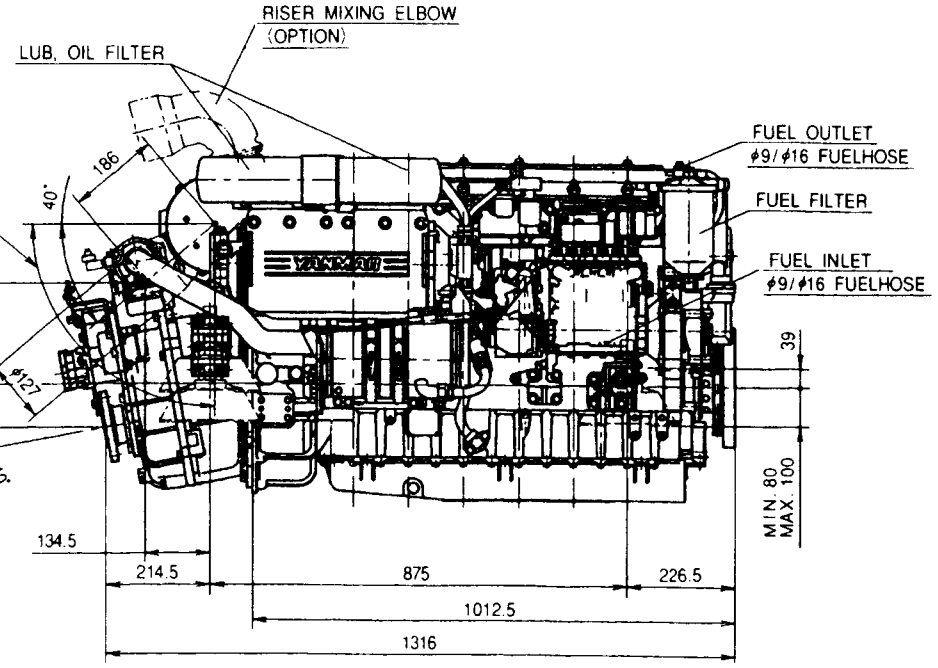


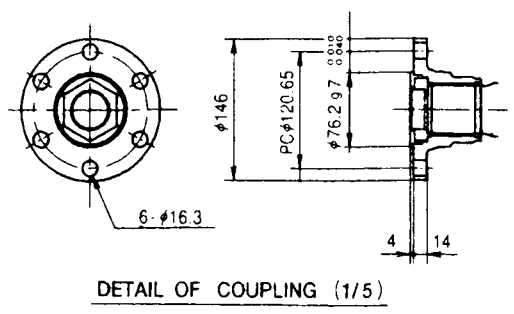
DETAIL OF FRONT COUPLING (1/5)











DETAIL OF COUPLING (1/5)

*,**: See 2, Specifications

SPECIFICATIONS				
MODEL		6LY2-STE		
CONT. RAITING OUTPUT (FLYWHEEL OUTPUT)	hp/rpm	350/3100		
	kw/rpm	257/3100		
MAX OUTPUT (FLYWHEEL OUTPUT)	hp/rpm	420/3300		
	kw/rpm	309/3300		
NUMBER OF CYLINDER		6		
REDUCTION RATIO (BOTH AHEAD AND ASTERN)		1.58	1.92	2.26
DRY MASS	kg	637		
DIRECTION OF CRANKSHAFT ROTATION		COUNTER CLOCKWISE (VIEWED FROM F/W SIDE)		

SPECIFICATIONS				
MODEL		6LY2A-STP		
CONT. POWER (FLYWHEEL OUTPUT)	hp/rpm	350/3100		
	kw/rpm	257/3100		
FUEL STOP POWER (FLYWHEEL OUTPUT)	hp/rpm	*440, **427/3300		
	kw/rpm	*324, **315/3300		
NUMBER OF CYLINDER		6		
REDUCTION RATIO (BOTH AHEAD AND ASTERN)		1.58	1.92	2.26
DRY MASS	kg	637		
DIRECTION OF CRANKSHAFT ROTATION		COUNTER CLOCKWISE (VIEWED FROM F/W SIDE)		